

What is claimed is:

1. A channel recovery method comprising the steps
2 of:

3 monitoring whether no synchronization is
4 established for a predetermined period of time between a
5 radio base station and a radio base station control
6 station which constitute a mobile communication system;
7 and

8 trying channel re-synchronization upon
9 shifting a timing of a channel synchronization clock
10 used for communication between the radio base station
11 and the radio base station control station.

2. A method according to claim 1, wherein
3 the step of monitoring comprises the steps of:
4 detecting a state change by monitoring, in a
5 predetermined cycle, operation states of a plurality of
6 cards constituting the radio base station and having
7 different functions;
8 determining whether or not contents of a state
9 change correspond to a channel disconnection of an
10 operational channel; and
11 starting a channel synchronization loss
12 detection timer in which a time during which a state
13 change is monitored is set, thereby determining whether
or not a channel synchronization loss has occurred, and

14 the step of trying the channel
15 re-synchronization comprises the steps of:
16 trying channel re-synchronization when it is
17 determined that a channel synchronization loss has
18 occurred, and
19 when a channel re-synchronization trial fails,
20 notifying a maintenance/monitoring console of the
21 failure.

3. A method according to claim 2, wherein the
2 step of detecting comprises the steps of
3 periodically starting a card state monitoring
4 timer which defines a cycle in which an operation state
5 is monitored,
6 monitoring an operation state of each card
7 when the timer expires,
8 when a state change is detected, checking
9 whether detected contents are identical to those
10 previously detected, and
11 storing the contents when the detected
12 contents differ from those previously detected.

4. A method according to claim 2, wherein the
2 step of determining whether or not a disconnection of
3 the operational channel has occurred comprises the steps
4 of
5 specifying a card whose state change is

6 detected as a card having a specific function, and
7 determining whether or not contents of the
8 state change correspond to a channel disconnection
9 during operation of the card.

5. A method according to claim 2, wherein in the
2 step of determining whether or not the channel
3 synchronization loss has occurred, if contents of the
4 state change correspond to a channel disconnection
5 during operation of card, a channel synchronization loss
6 detection timer is started, and a re-synchronization
7 monitoring flag for identifying a card having undergone
8 a channel disconnection is turned on to detect a change
9 in state of the same card within a timer time in a
10 channel synchronization loss detection timer; it is
11 determined that the channel disconnection is temporary,
12 and operation of the channel synchronization loss
13 detection timer is canceled if it is determined that the
14 contents of the state change correspond to a recovery
15 from a channel disconnection and the re-synchronization
16 monitoring flag is ON; and a channel synchronization
17 loss is determined if a change in state of the same card
18 cannot be detected within the timer time in the channel
19 synchronization loss detection timer.

6. A method according to claim 2, wherein the
2 step of trying comprises the steps of

3 if a channel synchronization loss is
4 determined, starting a synchronization failure timer and
5 a synchronization timing updating timer, the
6 synchronization failure timer defining at least one of a
7 standard for a transmission timing of a channel trouble
8 notification and a maximum trial time for channel
9 re-synchronization, and the synchronization timing
10 updating timer defining a unit time for a channel
11 re-synchronization trial, and
12 checking a state of the channel upon
13 expiration of the synchronization timing updating timer,
14 and registering a synchronization timing updating timer
15 again if a channel disconnection state is detected,
16 while trying channel re-synchronization, and canceling
17 operation of the synchronization failure timer if a
18 channel has been or is being established when the
19 synchronization timing updating timer expires.

7. A method according to claim 2, wherein the
2 step of notifying comprises the step of, when the
3 synchronization failure timer expires without
4 establishing channel re-synchronization after a plural
5 number of times of channel re-synchronization trials and
6 there is a normal channel, transmitting a channel
7 trouble notification to a maintenance/monitoring console
8 to prompt the console to make a channel check by using
9 the channel, stopping a radio transmission/reception

10 unit which is performing call connection using the
11 channel having undergone a channel trouble, and
12 switching to another normal radio transmission/reception
13 unit, the synchronization failure timer defining at
14 least one of a standard for a transmission timing of a
15 channel trouble notification and a maximum trial time
16 for channel re-synchronization.

8. A method according to claim 2, wherein the
2 step of notifying comprises the step of, if there is no
3 normal channel, restarting (resuming) a home station and
4 standing by until a channel with a radio base station
5 control station is recovered, in order to prevent a call
6 connection failure due to a channel trouble.

9. A mobile communication system including one
2 maintenance/monitoring console, a plurality of radio
3 base station control stations connected to said
4 maintenance/monitoring console, a plurality of radio
5 base stations connected to said radio base station
6 control stations, and a plurality of mobile units which
7 communicate with said radio base stations,
8 said radio base station including
9 channel synchronization loss determining means
10 for determining a channel synchronization loss when no
11 synchronization is established in a channel with one of
12 said radio base station control stations which is

13 connected to one of said radio base stations for a
14 predetermined period of time,
15 re-synchronization control means for trying
16 channel re-synchronization upon shifting a timing of a
17 channel synchronization clock used for communication
18 with said radio base station control station connected
19 to said radio base station, and
20 notifying means for, when channel
21 re-synchronization fails, notifying said
22 maintenance/monitoring console of the failure.

10. A system according to claim 9, wherein
2 said radio base station further comprises
3 central control means for monitoring and
4 controlling overall operation of the home station,
5 a plurality of radio communication means for
6 performing signal transmission/reception in a radio zone,
7 a plurality of cards constituting the home
8 station and having different functions,
9 a current-system SDM and a standby-system SDM
10 which constitute a redundant arrangement and store a
11 control program for operation of the home station and
12 operation parameters for monitoring an operation state
13 between the home station and said radio base station
14 control station,
15 a shared memory in which a read operation
16 parameter is expanded,

17 monitoring time setting means for monitoring
18 operation states of said plurality of cards, in a
19 predetermined cycle, of the operation parameters stored
20 in said current-system SDM and said standby-system SDM,
21 synchronization establishing means for
22 defining a maximum trial time for channel
23 re-synchronization,
24 a monitoring flag for identifying a card
25 having undergone a channel disconnection upon occurrence
26 of a channel disconnection, and
27 synchronization timing setting means for
28 defining a unit time for a channel re-synchronization
29 trial upon occurrence of a channel synchronization loss,
30 and
31 said re-synchronization control means
32 comprises re-synchronization control means equal in
33 number to channels and communicates with said radio base
34 station control station through a network.

11. A system according to claim 10, wherein said
2 central control means further comprises comparing means
3 for periodically monitoring an operation state of each
4 card at the expiration of a timer on the basis of said
5 set monitoring time setting means, checking, upon
6 detection of a state change, whether detected contents
7 are identical to those previously detected, and storing
8 the contents if the detected contents differ from those.

9 previously detected.

12. A system according to claim 11, wherein said
2 central control means further comprises
3 specifying means for determining one of said
4 cards whose state change is detected, and
5 determining means for determining whether or
6 not contents of the state change correspond to a channel
7 disconnection during operation of said card.

13. A system according to claim 12, wherein
2 said synchronization loss determining means
3 comprises a synchronization loss detection timer for
4 setting a time during which a state change is monitored,
5 and
6 said determining means starts a
7 synchronization loss detection timer, if contents of the
8 state change correspond to a channel disconnection
9 during operation of said card, on the basis of said
10 synchronization loss determining means, and turns on the
11 monitoring flag to detect a change in state of said same
12 card within a timer period of the synchronization loss
13 detection timer; cancels operation of the
14 synchronization loss detection timer, if it is
15 determined that the contents of the state change
16 correspond to a recovery from a channel disconnection
17 and the monitoring flag is ON; and determines a channel

18 synchronization loss if no change in state of said same
19 card is detected within a timer time in the
20 synchronization loss detection timer.

14. A system according to claim 12, wherein
2 said synchronization establishing means
3 comprises a synchronization establishment timer which
4 sets a maximum trial time for channel re-synchronization
5 control upon shifting a timing of a channel
6 synchronization clock, and
7 said central control means further comprises
8 re-synchronization establishing means for starting the
9 synchronization establishment timer, if a channel
10 synchronization loss is determined, on the basis of said
11 synchronization establishing means, prompting said
12 re-synchronization control means having undergone a
13 channel disconnection to perform channel
14 re-synchronization, causing said re-synchronization
15 control means to set a synchronization timing value for
16 said synchronization timing setting means, registering a
17 synchronization timing updating timer if a channel
18 disconnection state is determined upon checking of a
19 channel state at the end of the synchronization timing,
20 trying channel re-synchronization upon shifting a timing
21 of a channel synchronization clock in communicating with
22 said radio base station control station, and if a
23 channel has been or is being established when the

24 synchronization timing updating timer expires, canceling
25 operation of the synchronization failure timer upon
26 reception of a channel re-synchronization establishment
27 notification sent out from said re-synchronization
28 control means for which a channel is established.

15. A system according to claim 10, wherein
2 said notifying means transmits a channel
3 trouble notification to a maintenance person to prompt
4 the person to perform a channel check using a normal
5 channel, if any, when the synchronization establishment
6 timer of said synchronization establishing means expires
7 without establishing any channel re-synchronization by a
8 plural number of channel re-synchronization trials, and
9 said system further comprises switching means
10 for stopping said radio communication means which is
11 performing call connection using a channel having
12 undergone a channel trouble, and switching to another
13 radio communication means.

16. A system according to claim 15, wherein said
2 switching means restarts (resumes) the home station and
3 stands by until a channel with said radio base station
4 control station is recovered, in order to prevent a call
5 connection failure due to a channel trouble, if there is
6 no normal channel.

17. A system according to claim 10, wherein said
2 central control means further comprises updating means
3 for downloading the operation parameter from said radio
4 base station control station, writing the parameter in
5 said standby-system SDM, and updating the parameter.